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The amount of solar shrinkage was probably about 0.01 per cent of his diameter in 2,000 years. Fifteen million years ago the sun was probably four times its present diameter, and in another twenty million, its density will equal that of lead, and the activity of solar radiation will probably greatly diminish. At present it was about 75,000 horse-power per square metre. Looking back, although biology demanded more time, the study of dead matter would give twenty million years as a maximum past limit, and ten million years as a maximum future limit, of the heat received at present by the earth from the sun. The speaker created some amusement, towards the end of his discourse, by admitting that 'However, after all, we know nothing whatever about it!'

The Prince of Wales has just been elected an honorary member (probably the first British one) of the Linnaean society, which has hitherto been somewhat chary of bestowing its 'parchments sealed with wax.' This famous society was founded in 1788, and is the owner and custodian of the library, manuscripts, and herbarium of the illustrious Linnaeus, who died in 1778. These were originally bought from his family for about \$5,500, by Dr. James Edward Smith, who founded, and was first president of, the Linnaean society, which has comprised in its roll all the most distinguished naturalists of the day, and may be considered to be a select club of scientists.

The 'Christian evidence society' aims at counteracting the atheistic spirit which is alleged to be spreading among the masses in London. Latterly, its purely theological meetings and lectures have been frequently supplemented by lectures on scientific subjects delivered by men of well-known scientific position. In the west end of London, during the present month, the presidents of the Royal and of the Linnaean societies (Dr. Stokes and Mr. Carruthers) will take part in such a course, the former taking for his subject, 'Is the demand for demonstrative evidence in religion reasonable?' Dr. J. H. Gladstone and Mr. W. Lant Carpenter also take part in this course.

On Jan. 17 a notice was issued by the post-office cancelling all previous notices as to delay in the telegraph service owing to the break-down occasioned by the storm of Dec. 26. For the week ending Jan. 15, the number of messages was 803,000, as against 736,000 for the corresponding week of last year, notwithstanding the fact that senders were warned as to probable delay. The department has been able to have this good record while the wires were down, mainly through the free use of the Wheatstone automatic fast-speed transmitter, which for a long time has been doing 700 words per minute (350 in each direction, the line

being duplexed) over one wire between Newcastle and London, about 300 miles. Every effort was made to get messages through, no matter how circuitous the route. Some messages reached London from Paris *via* New York. In the angry controversy which has been raging on overhead *versus* underground lines, the following statements have been put forward on authority: The English post-office has 20,000 miles of underground lines, as against 22,000 in Germany. The cost of an underground wire is £350 per mile, and of every additional wire, £15, as against £35 and £10 respectively for overhead wires. Underground wires diminish the speed of signalling from 25 to 75 per cent over long distances. The cost of renewal and maintenance is about the same in both cases.

The present year is the jubilee of the queen's accession to the throne. There is considerable fear that the proposal for an 'Imperial institute,' as a commemoration thereof, will not be adequately supported, and, in scientific circles, much feeling exists at the scanty recognition of science in the constitution of the committee (nominated by the Prince of Wales) which framed the scheme, and, *a fortiori*, in the scheme itself.

An interesting history of the 'Science and art department' has just been issued, showing its growth during the last fifty years, and the encouragement given by the state in this way to instruction in science and art. Its headquarters are in South Kensington, which is in connection with about 1,500 scientific schools all over the United Kingdom. Twenty-five distinct branches of science are taught, and the annual grant for its maintenance approaches half a million pounds sterling. This is mainly distributed on the results of the May examinations, held at the end of the winter's teaching. In connection with this are the scholarships due to Sir Joseph Whitworth's contribution of £3,000 per year, given in 1868.

W.

London, Jan. 22.

HONOLULU LETTER.

MR. E. D. PRESTON of the U. S. geodetic survey has just arrived and begun work under temporary engagement with the Hawaiian government survey. His task is to establish a normal or standard latitude for this group. The latitude of several points has already been carefully determined, — two such in 1883 by Mr. Preston in connection with pendulum observations, and some others by the British observers of the transit of Venus. Since full geodetic results have been obtained by inter-island triangulation, serious discrepancies are found to exist between these and

the astronomical determinations of latitude, rising as high as forty-five seconds of latitude in the relative positions of stations on neighboring islands. The study of these discrepancies shows them to be due to local deflections of the vertical in consequence of the powerful attraction of our great mountain-masses. The error produced appears to be greater than in any other part of the world in proportion to the extent of the geodetic work. A discrepancy in longitude of sixty seconds is found to exist between Kailua and Honolulu, 150 miles distant. These longitudes were determined by the British transit expedition, transporting twelve chronometers three round trips between the stations. The mountains of these islands rise above the sea from 4,000 to 14,000 feet. But being surrounded by a depth of ocean of, say, 25,000 feet, the masses are really from 30,000 to 40,000 feet high, fully accounting for the extraordinary deflection of the vertical. Twelve stations have been selected whose positions are precisely determined, and which lie on opposite sides of their respective islands. Mr. Preston will occupy each one, so as to secure at least one hundred observations of pairs of stars. It is believed that a study and comparison of the discrepancies between the latitudes obtained will enable a standard latitude to be determined for the whole group, very closely approximating to the true latitude.

No precise determination of longitude can possibly be obtained until there is cable communication between Honolulu and the continent. It now seems probable that such communication will soon be established. Mr. Preston's work will then be available in corrections to determine a standard longitude as well as latitude for this group. When these corrections for the latitude and longitude are applied to the transit of Venus station at Honolulu, it seems not unlikely that better results may be obtained from the work done by the British transit expedition.

A panorama of the caldera of Kilauea goes today to the United States for public exhibition. It is an accurate representation of the great enclosure, and of the interior active lakes, as seen at the period of culminating action shortly before the periodical collapse which took place last year. The work is by an eminent artist, Jules Tavernier, who is particularly successful in vivid representation of incandescent lava. The whole is lifelike and realistic. Although startling, it possesses a high scientific value, far beyond a mere popularizing of the subject.

Since the collapse, the lava has re-appeared in force, and is slowly rising in the lakes, already presenting brilliant exhibitions. After a period of the highest activity, the lakes suddenly sank out

of sight, leaving deep pits, the bottoms of which were 700 feet lower than the previous level of liquid lava. The surveyor-general embraced the opportunity for a precise survey of Kilauea and its branch craters, which has been completed. It will probably be several years before any thing like the recent high level of lava is again attained. A remarkable phenomenon still proceeding has been the uplifting from the bottom of the pit, as if by colossal jack-screws, of a veritable mountain island of lava more than 500 feet in diameter and 150 feet high, around which the liquid lava flows. This permanent island has already risen some 300 feet within seven months. The best facilities are now given for access to the crater, involving five days' absence from Honolulu, at the cost of fifty dollars, covering all transportation, hotel fare, and guides, with two days at the crater. K.

Honolulu, Jan. 18.

GEOGRAPHICAL NOTES.

Asia.

Dr. A. Bunge and Baron E. Toll have returned from their journey to the New Siberian Islands. They have made valuable collections and observations on the five islands of this group, which of late became so famous by the hazardous boat journey of the Jeannette crew. The results of this, the first scientific expedition to these islands, will be of great interest.

There are new reports on Potanin's expedition to southern Mongolia. His return was announced in the St. Petersburg letter of last issue. Potanin left the district of Koko-Nor on June 25, 1886, crossed the desert of Gobi on a previously unknown route from south to north, and discovered four parallel chains of mountains, which form the south-eastern continuation of the Altai system. The journal of the Imperial Russian geographical society contains a report on his last exploration in the district of Koko-Nor. He explored that part of the Nan-shan mountains which separate the country drained by the Hoang-ho from the plains of southern Mongolia. It is composed of three mountain ranges, with passes 12,800 feet in height, and intermediate valleys at an elevation of 10,000 feet. On his way north he fell in with the Jegurs, a tribe hitherto unknown. Potanin surveyed the whole country he traveled over, and determined the position of seven places by astronomical observations. His companion, the naturalist Beressowski, will stay near Kiachta until next winter in order to complete his collections.

Mr. E. Michaelis, in *Nature* of Dec. 16, states that traces of the ice-period are found in the southern parts of the Altai Mountains. Farther